California Energy Commission

2005 Electricity Environmental Performance Report

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June 27 and 28, 2005

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Legislative Direction to Assess Environmental Topics in Integrated Energy Policy Report

- **SB 1389** (Bowen, 2002)
  - 25301(a) Directs the Energy Commission to "develop energy polices that conserve resources and protect the environment…"
  - 25302(a) Directs the Energy Commission to prepare an Integrated Energy Policy Report (IEPR) addressing major energy trends and issues, "including, but not limited to … impacts on … resources and the environment."

2005 Energy Report
Environmental Topics

Committee Has Directed Staff to Investigate 5 Environmental Topics for 2005 Energy Report

1. Electricity Environmental Performance Report
2. Petroleum Infrastructure Environmental Performance Report
3. Global Climate Change Report
4. Water and Energy Report
5. California / Mexico Border Energy and Environment Report

What is the Electricity Environmental Performance Report?

- Sub-Report to the Commission's Biennial Energy Report to Legislature and Governor
- Systematic, science-based assessment of status and trends in environmental performance for all parts of California's 61,000 MW generation system and the transmission system
- Provides factual basis for environmental policy recommendations related to power generation
- Identifies issues ripe for policy considerations or further study

What is Environmental Performance?

- Thermal Efficiency
- Environmental Discharges and Resource Uses
  - Quantity of emissions, effluent, waste, water, land, habitat used in power generation
  - Rates of change
  - Pollution controls
- Environmental Quality Effects
- Environmental Efficiency
  - Unit of impact per unit of power

CEC Approach

- State & Regional-level Discharges & Emissions by Media and Generation Sector
  - Identify System "footprint"
  - Total amounts and rates of change from 1996 baseline
- Technology and regulatory trends
  - BARCT, SCR, ZLD, 316(b) rule, FERC hydro licensing
- Identify key issues and areas of concern
  - Water use, hydropower impacts, once through cooling effects, avian issues
- Assessments based on data and analyses conducted by staff, other agencies, academia, industry and other stakeholders
- Not a compliance report: assess trends, impacts & issues independently of permit status and CEC jurisdictions

Major Elements of 2005 EEPR

- 2005 Electricity Environmental Performance Report
  - Environmental Data Request
- Supporting Staff Reports
  - Preliminary Environmental Profile of California's Imported Electricity
  - Issues and Environmental Impacts Associated with Once Through Cooling at California's Coastal Power Plants
  - Assessment of Avian Mortality from Collisions and Electrocutions
  - Potential Changes in Hydropower Production from Global Climate Change in California and the Western U.S.

    (Water – Energy Workshop, June 21)

Data and Methods for 2005 EEPR

- 2003 EPR Finding: Lack of Data is Significant Hindrance
- 2005 Environmental Data Request
  - Location & ownership, air, water, hydro, socioeconomics
  - Sent to 691 facilities > 1MW
  - Rec'd from 453 facilities totaling 53,441 MW
  - Problems with timeliness and quality
  - Staff Proposing Rulemaking to Develop Consistency

Methodology

- Air Quality Unit Developed New Generation & Emissions Database
- Captures Generation, Fuel Use and Emissions for 61,000 MW of In-State Capacity
  - Based on EAO's Database and QFER Data
  - Facility and Unit Level Data
- Allows for Detailed Assessments by Region and Technology or Fuel Type
- Database Developed for Out of State

Findings for 2005 EEPR

- General Environmental Performance is Good
  - Small electricity sector environmental footprint compared to other parts of US and the world
  - Natural gas is predominate thermal fuel
  - Diverse mix of fuel types
  - Very strong air emissions regulatory program
- Positive Trends in Electricity System Performance Identified in 2001 and 2003 EPRs Are Continuing
  - Air, Water, Terrestrial Biological Resources
- But, Performance Varies by Technology Sector
- Significant On-Going Impacts to Aquatic Resources
- Concerns About Avian Mortality

Figure 3-1 2001 to 2003 Monthly Generation (GWh)

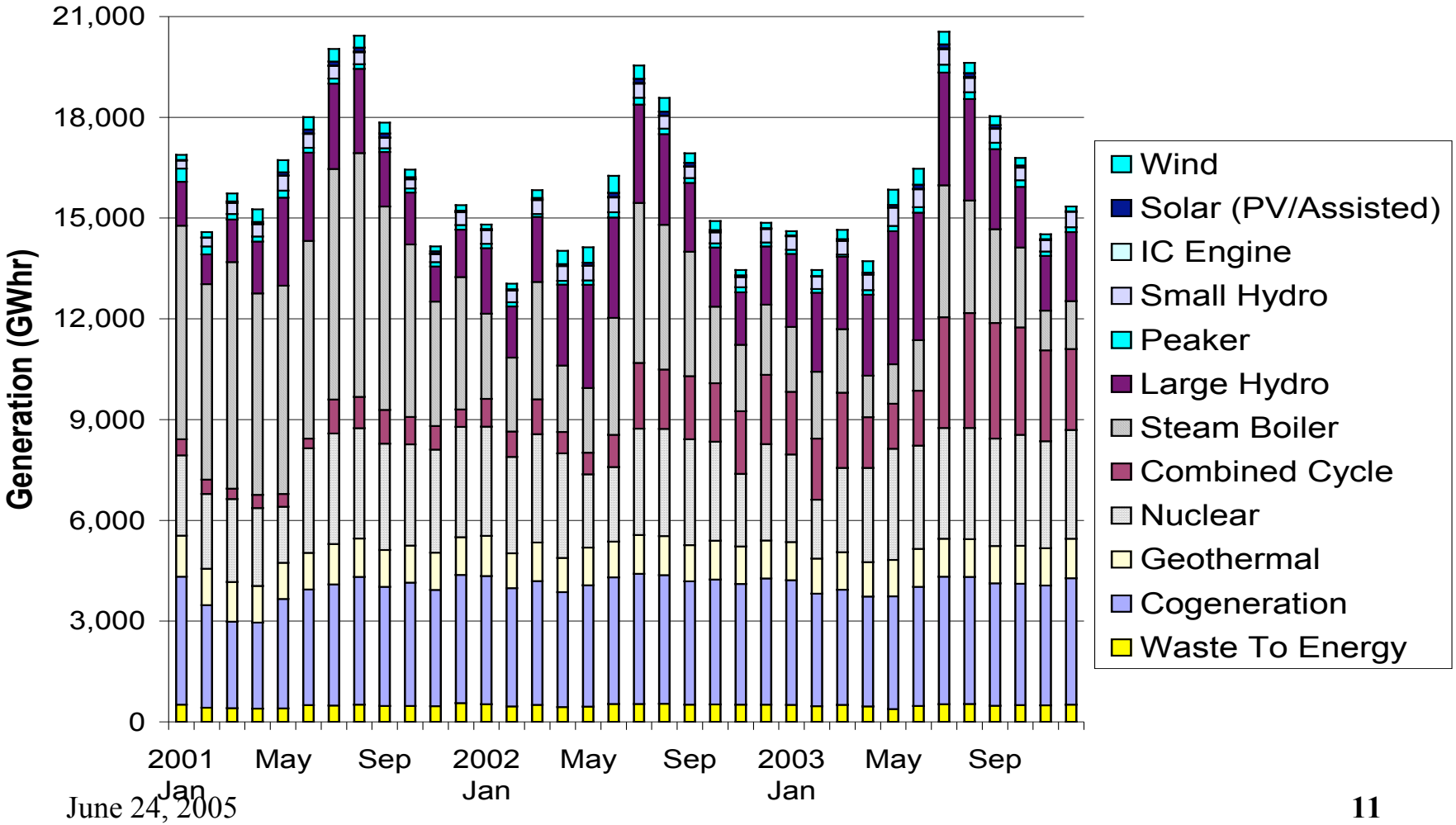


Figure 3-5 2001 to 2003 Statewide NOx Emissions (tons/month) and NOx Emission Factor (lbs/MWh)

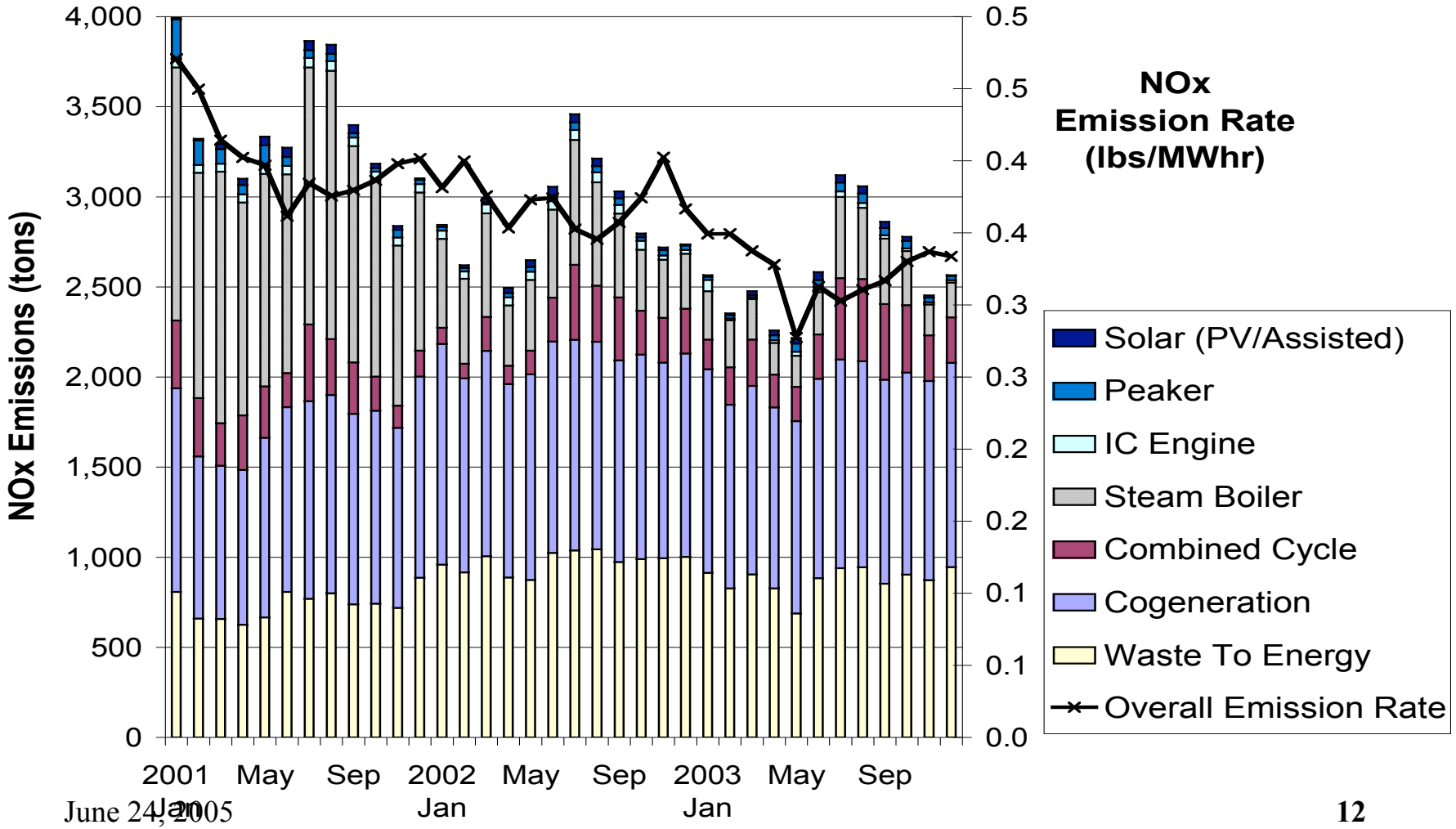
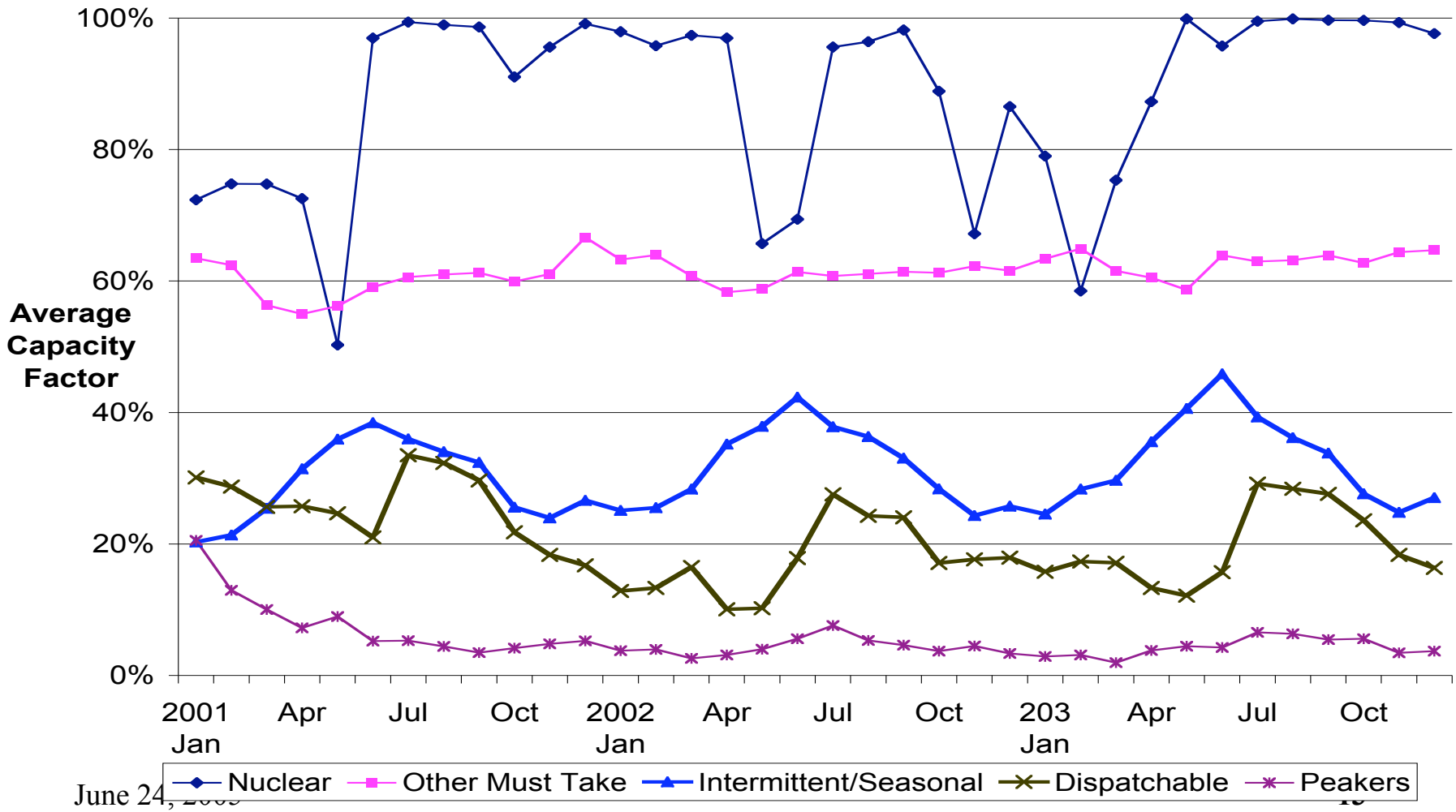


Figure 3-2 2001 to 2003 California Generation Category Average Capacity Factors



Power Sector Air Emissions

- California Has Very Poor Air Quality, But Emissions from the Power Sector No Longer a Principal Driver of Air Quality Planning in Most Air Districts
- From Staff Perspective, No Longer a Key Issue
- Reasons
  - At State level, power sector NOx is 1 % of total NOx
  - Strong and effective regulatory program
    - BACT, BARCT, ERCs,
  - New combined cycles becoming operational
  - Low toxic risks to public health
- Within Fleet, Important Differences Between Technologies
  - Cogeneration and Biomass Have High Emissions Rates
- Cleanest Part of Fleet Tends to Be at End of Dispatch Queue

Once-Through Cooling Impacts
"Sea Water is Habitat"

- Near Shore Marine Ecosystems Impacted by Once Through Cooling Systems
  - 21 Power Plants Totaling 23,883 MW Use OTC
- Level of Impact Potentially Significant and Widespread
- Under-Studied and Under-Appreciated Issue
- Concerns Coincide with Ocean Protection Council, Federal Oceans Reports, and EPA Rule Change to CWA 316(b)
- Major CEC Staff Report Prepared for IEPR Includes Policy Options
  - Staff Report to be Presented at 9:00 on June 28 Workshop

Hydro Impacts To Inland Waters

- 14,000 MW Hydro System Perpetuates Significant, On-Going, Under-Mitigated Impacts
- Thousands of Miles of Rivers and Streams No Longer Support Sustainable Ecosystems for Wild Salmon, Trout and Amphibians
- Only 29 of 119 FERC-Licenses Projects Meet Current State Water Board Water Quality Standards
- Current Relicensing Boom Provides Opportunities to Meet Current Standards
- CEC Providing Support to State Agencies on Klamath and Other Projects

Avian Mortality

- Wind Power Will Expand to Meet RPS Goals
- Avian Mortality from Collisions Continuing Issue of Concern
- High Mortality Rates at Altamont Have Resulted in Moratorium on Expansion
- Solano County WRA Emerging as Area of Concern
- 3 Other WRAs Have Lower Bird Use and Risk
- CEC PIER Program Conducting Studies and Developing Mitigation to Resolve Conflicts
- Staff Report for Wind Energy and Powerline Issues Afternoon of June 28 Workshop Includes Policy Options

Environmental Profile of Electricity Imports

- Imports Total 31% of California's Electricity
  - 9% Comes From Power Plants Owned by Cal Utilities
- Coal Is Major Part of California's Electricity Supply
  - Dedicated Coal Totals 4,744 MW
- Out of State Emissions Higher than In-State
  - NOx Rate Nearly 4 Times Higher
- Coal Becoming Fuel of Choice
  - 27 New Plants Totaling 15,900 MW
  - Most to Use Pulverized Coal Combustion: Highest Emissions
- Water Use is Issue of Concern for New Plants in West

Emerging Themes and Trends

- **Renewable Energy Impacts**
  - Cogeneration and Biomass: Emission Rates and Dispatch
  - Wind Energy Impacts to Birds and Raptors
  - Hydro Impacts to Aquatic Ecosystems
- **Old Infrastructure is Expensive to Upgrade**
  - Regulatory Systems Not Keeping Pace with Science
  - Once Through Cooling Technology Dates from 1950's
    - 5 Repower Applications with State of Art Emissions Controls, But 1950's-Era Cooling Systems
    - Concerns Over Coast and Oceans Growing
  - Hydro System Dates from 1900
    - FERC Licenses 30-50 Years Old
  - Decommissioning and Relocation May Make Sense in Some Cases

Emerging Themes and Trends

- **More Research Needed for Expanding Parts of Electricity System – Wind and Transmission**
  - Generally Considered to Be Environmentally Benign
- **Costs and Benefits of Electricity Imports**
  - 31% of Electricity Imported
  - Growing Concern Over Climate Change and CO_2
  - Regional Win-Win, or Export of Pollution?
- **Climate Change Environmental Effects**
  - Mitigation Habitats
  - Inland Rivers and Streams

Agenda and Process for Workshop

- Agenda
  - June 27: EEPR and Out of State Power
  - June 28: Once Through Cooling and Avian Mortality
- For each agenda item
  - Staff presentation
  - Government agency comments
  - Stakeholder comments
- Commissioners may ask clarifying questions
- Speakers should use microphone and state name and affiliation for the record
- Written comments encouraged through July 15
- Will move through agenda as items are completed

An Overview of California's Electricity System

California Energy Commission

Ron Wetherall, Electricity Analysis Office

Electricity Environmental Performance Report Workshop
June 27, 2005

Electricity System

- System Operator
  - Ensures reliability by dispatching resources or curtailing demand as needed
- Generation
- Transmission
  - Owned by IOUs and Munis; controlled by System Operators
- Distribution
  - Maintained and operated by local electric companies like SMUD, PG&E, City of Vernon.

California's Sources of Generation

- Merchant Generators
- Qualified Facilities (co-gen and renewable)
- Municipal Utilities
- Regulated Utilities
- Federal and State Government Projects
- Imports from other states, Mexico and Canada
- Self-Generators

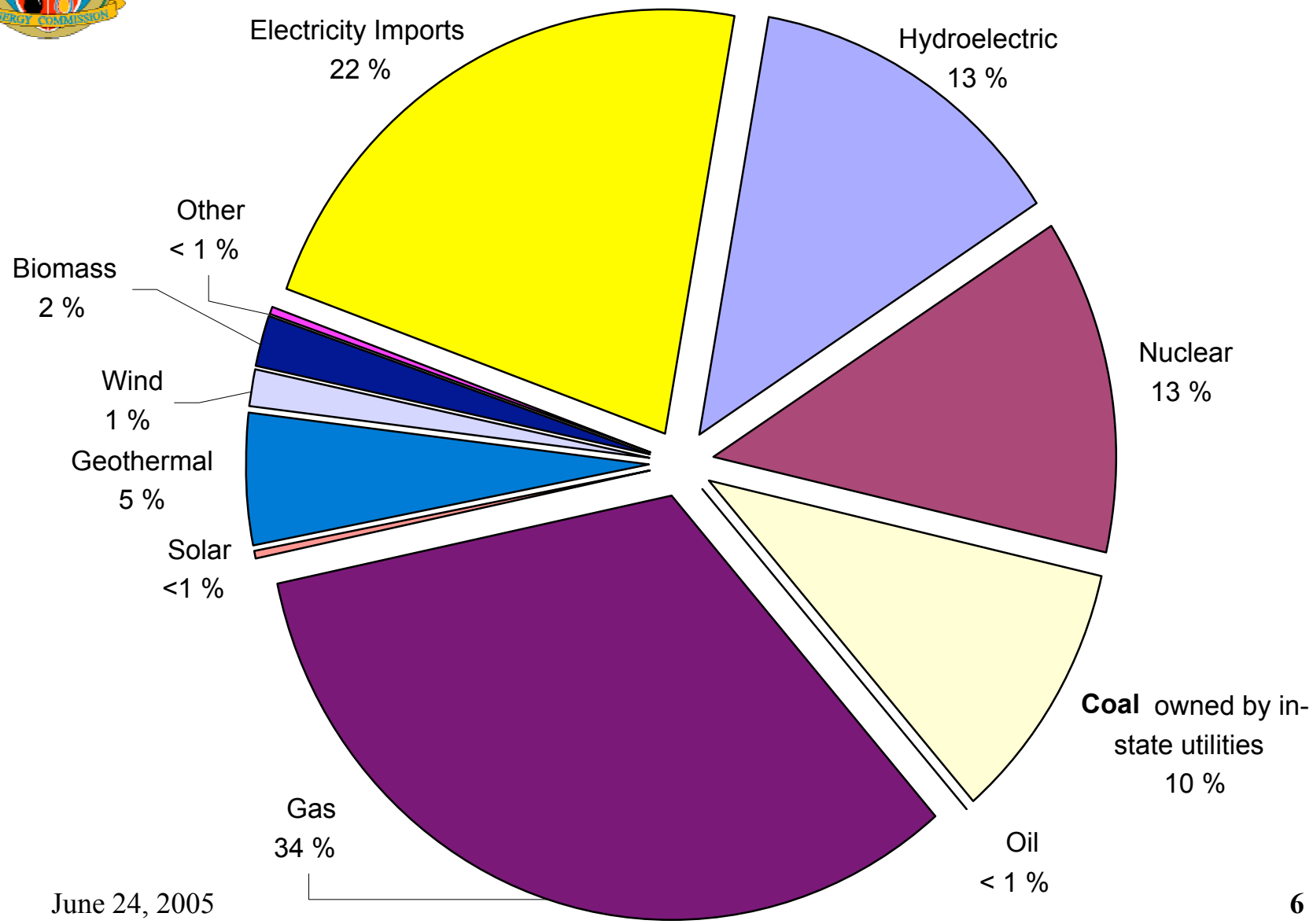
California's Diverse Generation Technologies

- Natural Gas
- Hydroelectric
- Coal
- Nuclear
- Renewable Generation
  - Geothermal
  - Wind
  - Solar
  - Biomass

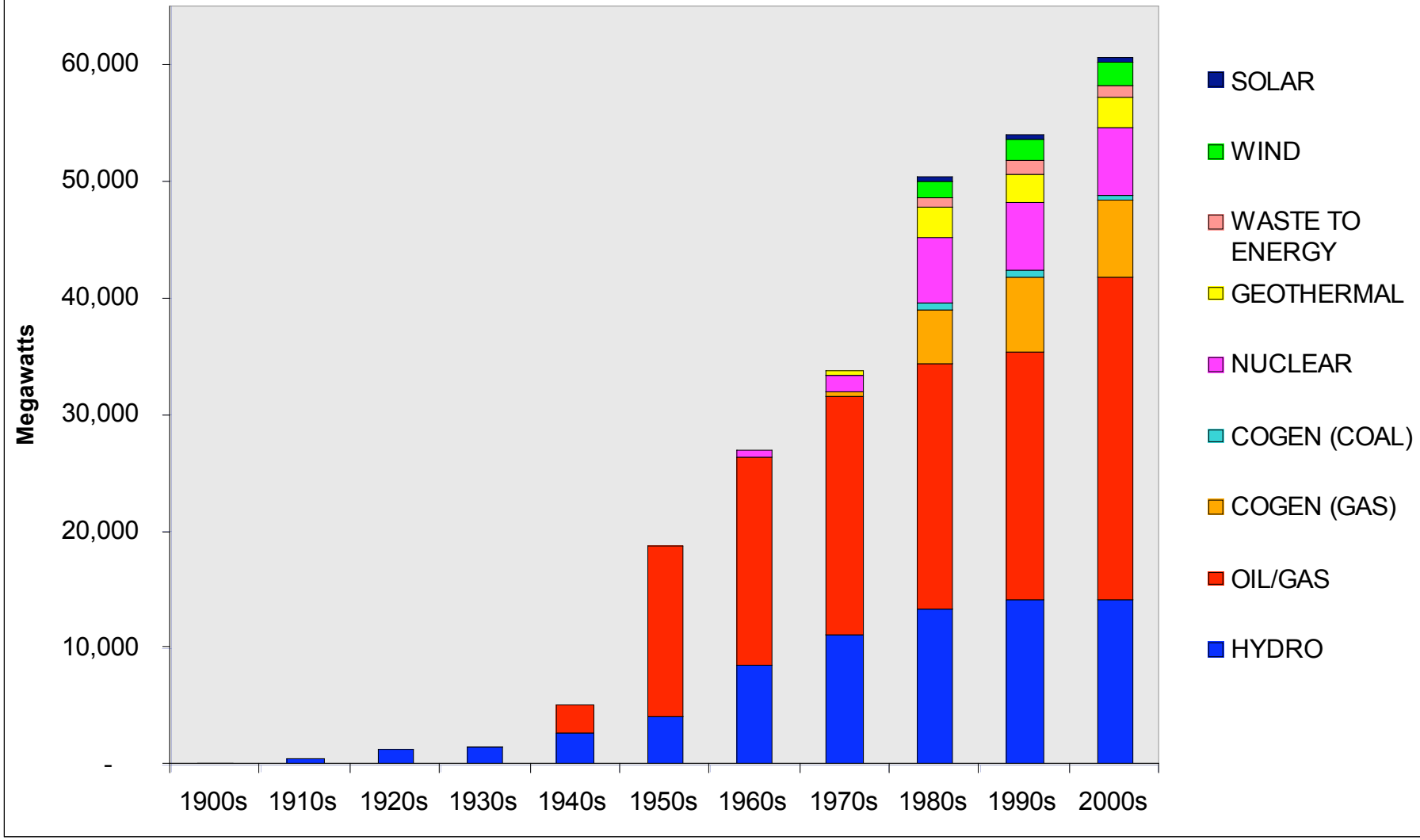
California's Resource Mix is Diverse

- Diverse mix of electricity generation technologies totaling approximately 61,000 megawatts (MW) of in-state nameplate capacity.
- 12,611 MW in new nameplate capacity has been added since 2001, including 225 MW of wind added since 2003.
- California utilities have 6,200 MW of dedicated capacity that is located out of state, but residing within California control areas.

Electricity Consumed in California by Fuel Type (2003)



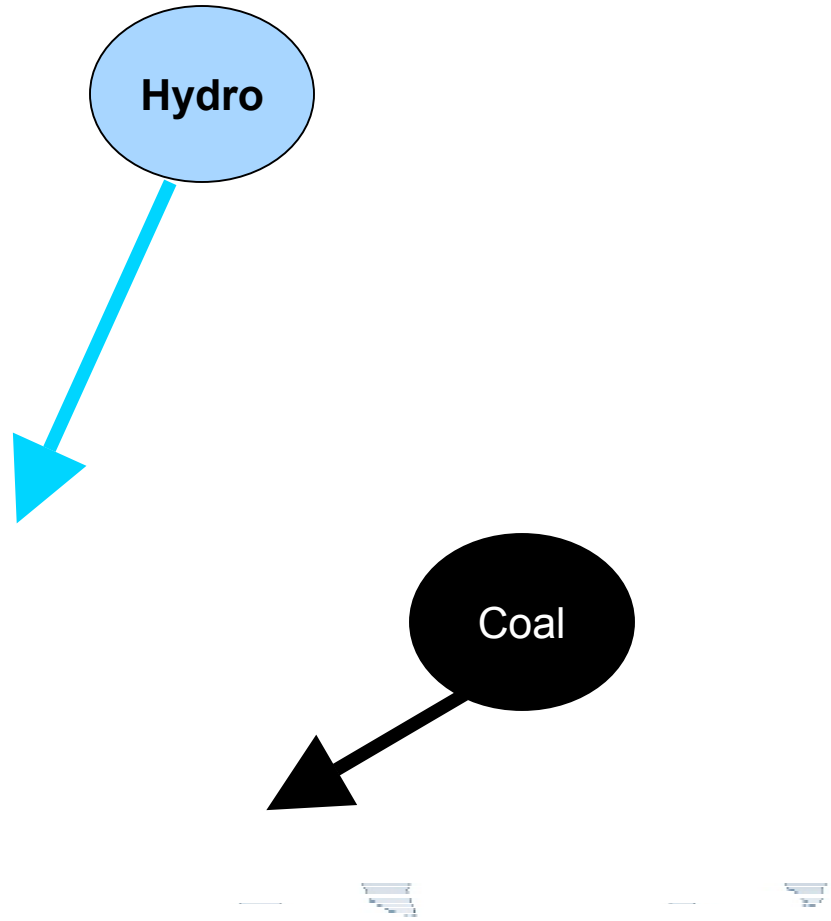
Cumulative Generating Capacity in California by Decade and by Fuel/Technology Type



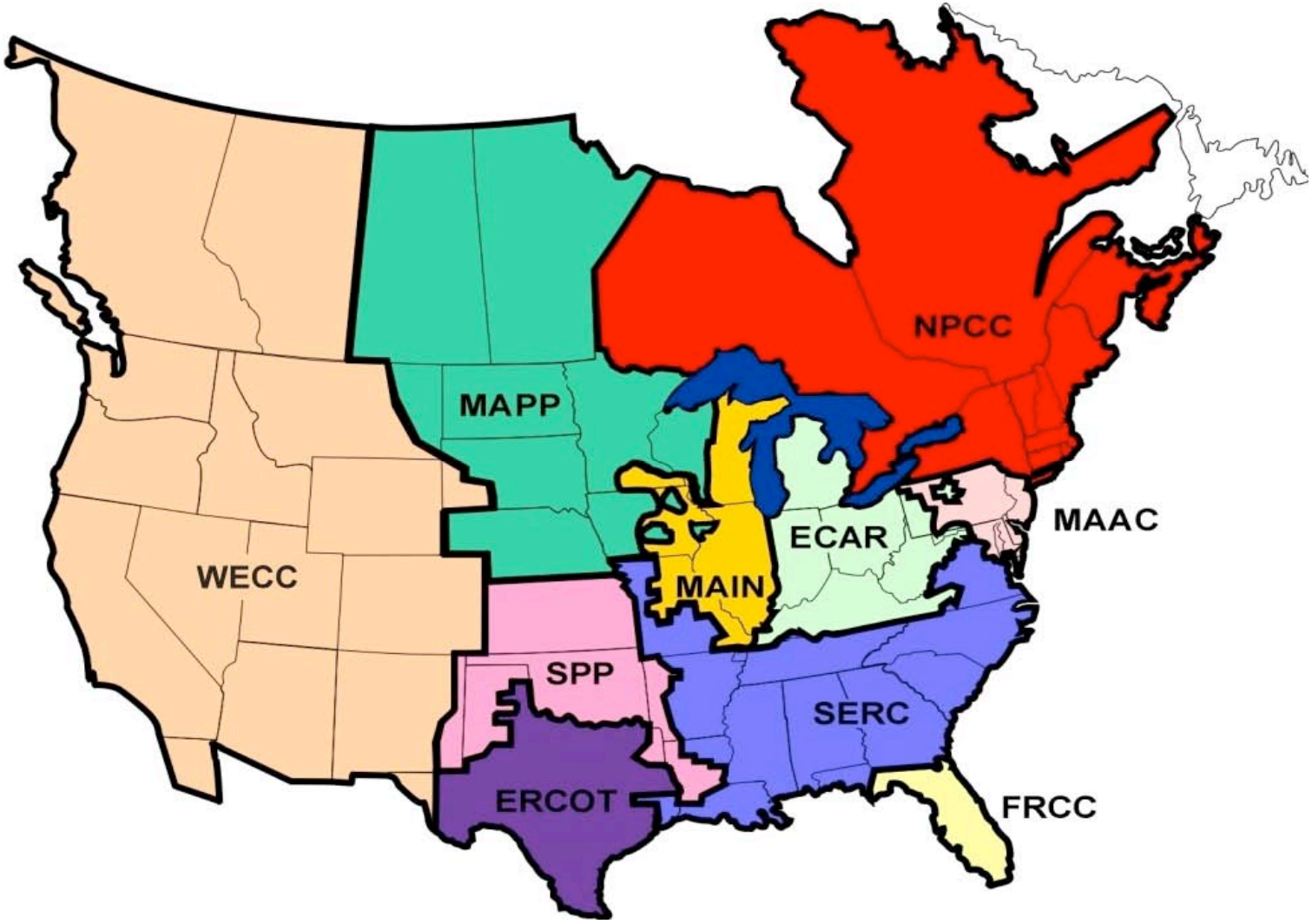
Electricity Imports Are Significant

- Electricity imported from western states, Canada and Mexico provide about 22 percent of the energy needed to meet California's annual demand.
- Significant amounts of surplus generation capacity are available in the Western Electricity Coordinating Council.
- Pacific Northwest experiences peak demand during winter.
- California and the Southwest experience peak demand during the summer.
- Both benefit from seasonal exchanges of surplus capacity and energy.

Interconnected Western Grid



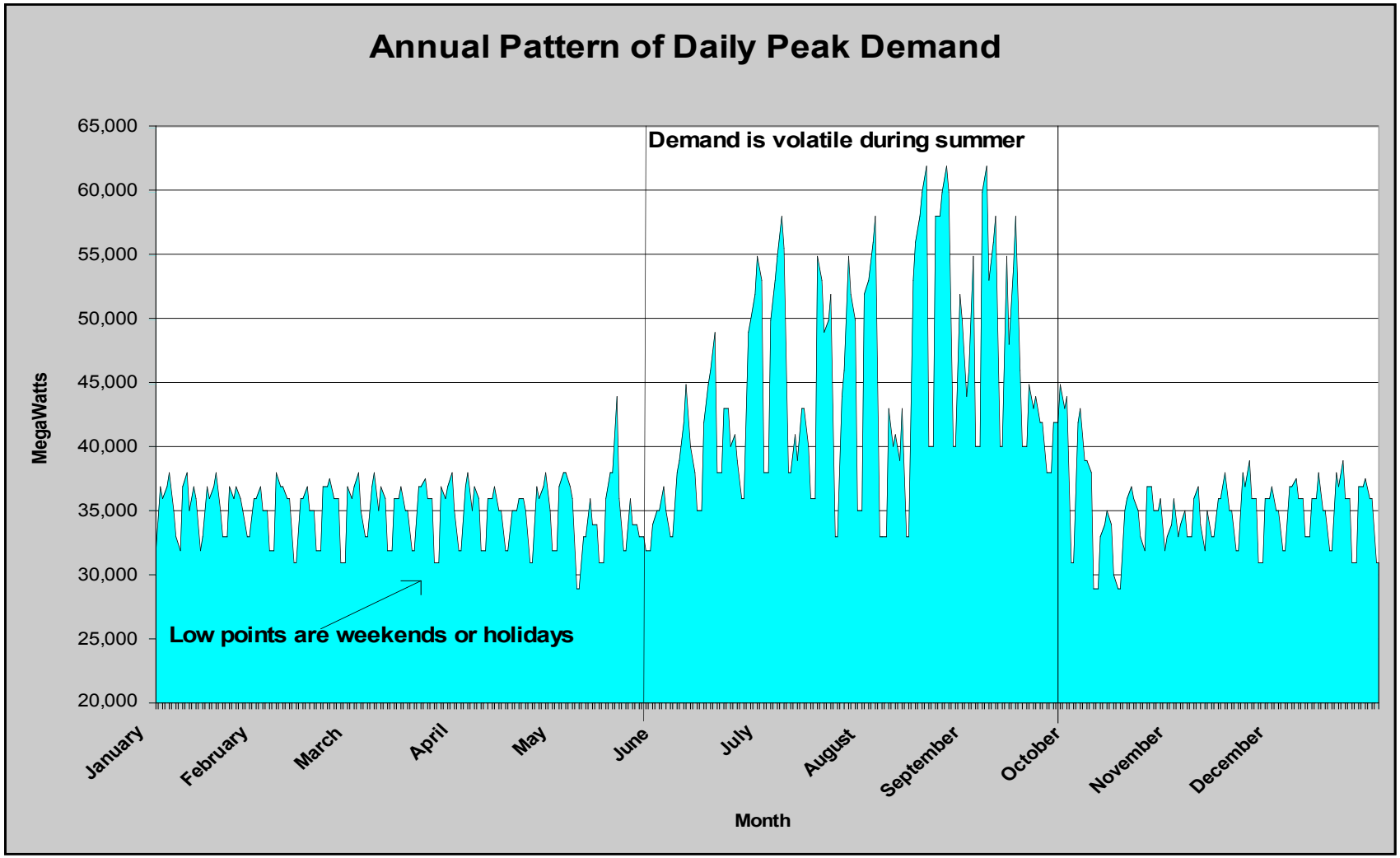
Western Electricity Coordinating Council



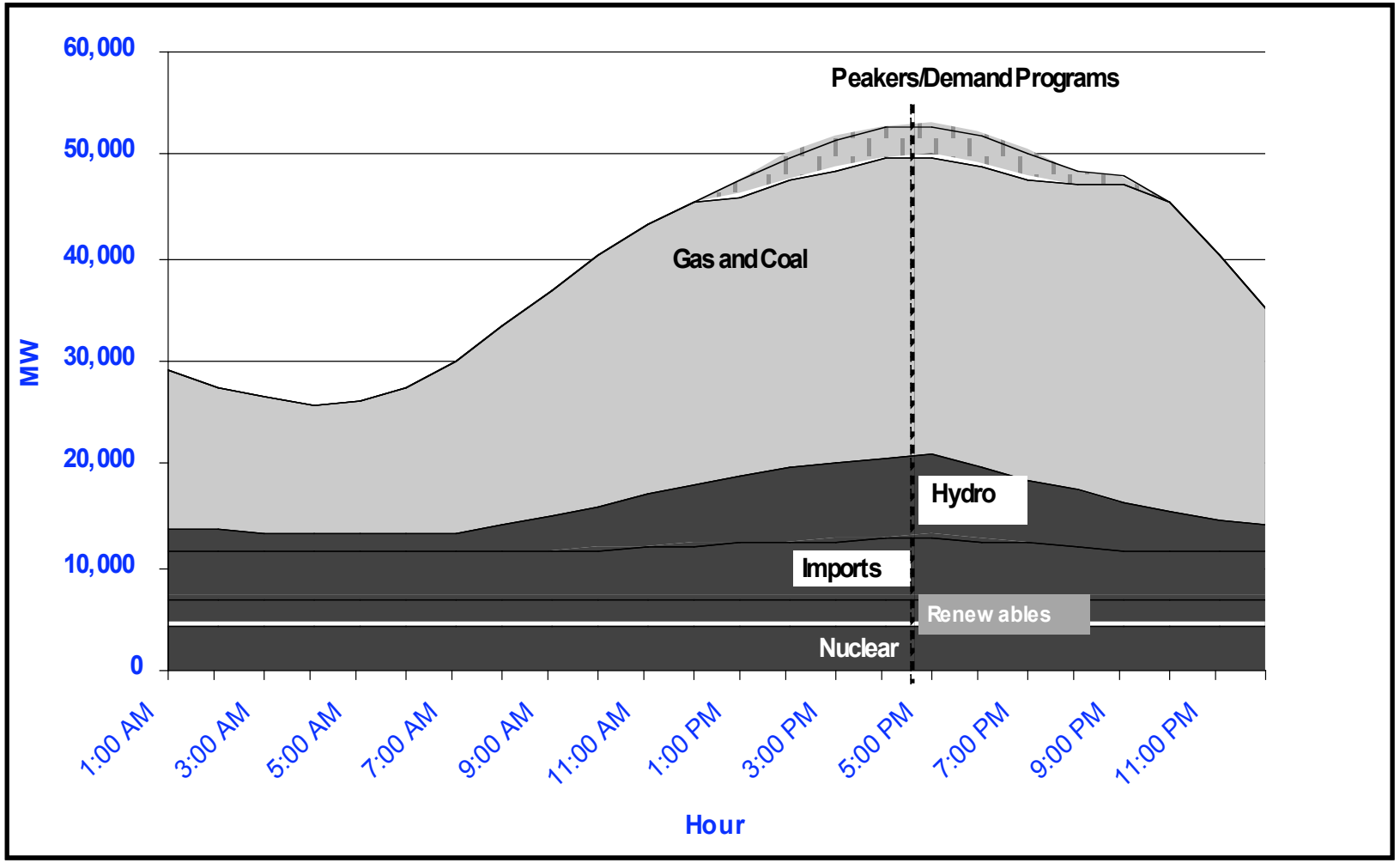
Peak Demand vs. Average Demand

- Peak Demand and Average Demand Are Significantly Different.
- Thousands of megawatts of in-state generating capacity sit idle for much of the year except when called upon to meet peak demand periods.

Demand is Volatile During Summer



Electricity Supply Profile for a Typical Hot Summer Day



Viable Alternatives Are Available to Meet Peak Demand

- Mechanisms that shift demand away from peak periods to times when more capacity is available are effective.
- These include time-of-use metering and rates, thermal energy storage systems, and media-driven appeals for voluntary conservation, such as the "Flex Your Power" program.

Transmission Congestion Could Become a Resource Constraint

- Congestion on the grid, south of Path 15, may affect the ability to deliver electricity where it's needed this summer.
- This congestion results from lack of transmission upgrades.
- During peak demand periods on a very hot summer workday, California may face resource constraints.

The Energy Action Plan is Guiding Procurement

- The California Public Utilities Commission oversees the development of the Investor Owned Utility (IOU) electricity procurement process.
- As a partner in developing California's Energy Action Plan, the CPUC will follow the EAP's preferred loading order of resources in making procurement decisions.

Energy Action Plan's Loading Order of Resources

- 1) Deploy all cost effective energy efficiency measures
- 2) Promote renewable generation and distributed generation;
- 3) Build new or re-power existing large centralized generating facilities;
- 4) Improve bulk transmission grid and distribution facility infrastructure.

Summary of Findings

- California's Resource Mix is Diverse and Expanding
- Imports Provide a Large Portion of California's Electricity
- Peak Demand and Average Demand Are Significantly Different
- Transmission Congestion Contributes to Potential Resource Constraints
- Viable Alternatives Are Available to Meet Peak Demand
- The Energy Action Plan is Guiding Procurement

Air Emissions and Air Quality

Mike Ringer

Air Quality Unit

Air Quality
Summary of Findings

- Air Emissions from the in-state power generation fleet are a small, increasingly clean part of the emissions inventories for California air basins
- Emissions from the in-state generation system are low and are no longer a principle driver of air quality or attainment planning in most air districts.
- Air emissions are not factors in plant dispatch. The dirtiest parts of the fleet are not being displaced, while the cleaner parts of the fleet appear to be last in the queue for dispatch.

Data

- QFER monthly generation and fuel use data for each unit at about 1000 facilities represent over 61,000 MW of in-state electricity generating capacity.
- Still some disparity between unit identification and data within the QFER database, the EPR Forms database, the Environmental Office Database, and actual plants.
- Emission factors for each facility derived from EPR Forms, E-GRID database, CEC files, or EPA AP-42 Emission Factor Compendium.
- The data provides comparative information on generation technology and fuel type over 36 months.

Regional Analysis

- Three districts analyzed: South Coast and Bay Area Air Quality Management Districts, and the San Joaquin Valley Air Pollution Control District.
- Contain about 76 percent of the state's population
- Contain about 70 percent of the state's total NOx and ROG emissions.
- However, they only generate about one-third to one-half of the state's electricity, and have a disproportionate share of in-state generation emissions (generally ½ the generation emissions).

District and Statewide Electricity Generation Emissions as a Percent of District and State Total Emissions (Table 3-3)

Oxides of Nitrogen		**1995**	**2000**	**2004**	**2005**	**2010**	**2015**	**2020**
Bay Area	Electric Utilities	1.6%	2.4%	0.8%	0.7%	0.9%	1.2%	1.3%
	Cogeneration	1.2%	0.7%	0.8%	0.8%	1.0%	1.3%	1.5%
San Joaquin	Electric Utilities	0.5%	0.5%	0.6%	0.7%	0.8%	0.9%	1.2%
	Cogeneration	2.8%	1.7%	2.1%	2.2%	1.9%	2.3%	2.9%
South Coast	Electric Utilities	1.3%	1.0%	0.6%	0.8%	1.0%	1.2%	1.4%
	Cogeneration	0.2%	0.3%	0.3%	0.3%	0.3%	0.4%	0.5%
Statewide	Electric Utilities	1.7%	1.8%	1.0%	1.1%	1.5%	1.8%	2.1%
	Cogeneration	1.0%	0.9%	1.0%	1.0%	1.1%	1.4%	1.6%

PM10		**1995**	**2000**	**2004**	**2005**	**2010**	**2015**	**2020**
Bay Area	Electric Utilities	0.2%	0.7%	0.4%	0.5%	0.5%	0.5%	0.5%
	Cogeneration	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%
San Joaquin	Electric Utilities	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%
	Cogeneration	0.4%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%
South Coast	Electric Utilitiesl	0.2%	0.2%	0.7%	0.7%	0.7%	0.7%	0.7%
	Cogeneration	0.0%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Statewide	Electric Utilities	0.3%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%
	Cogeneration	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%

Fig. 3-1
2001 to 2003 Monthly Generation (GWh)

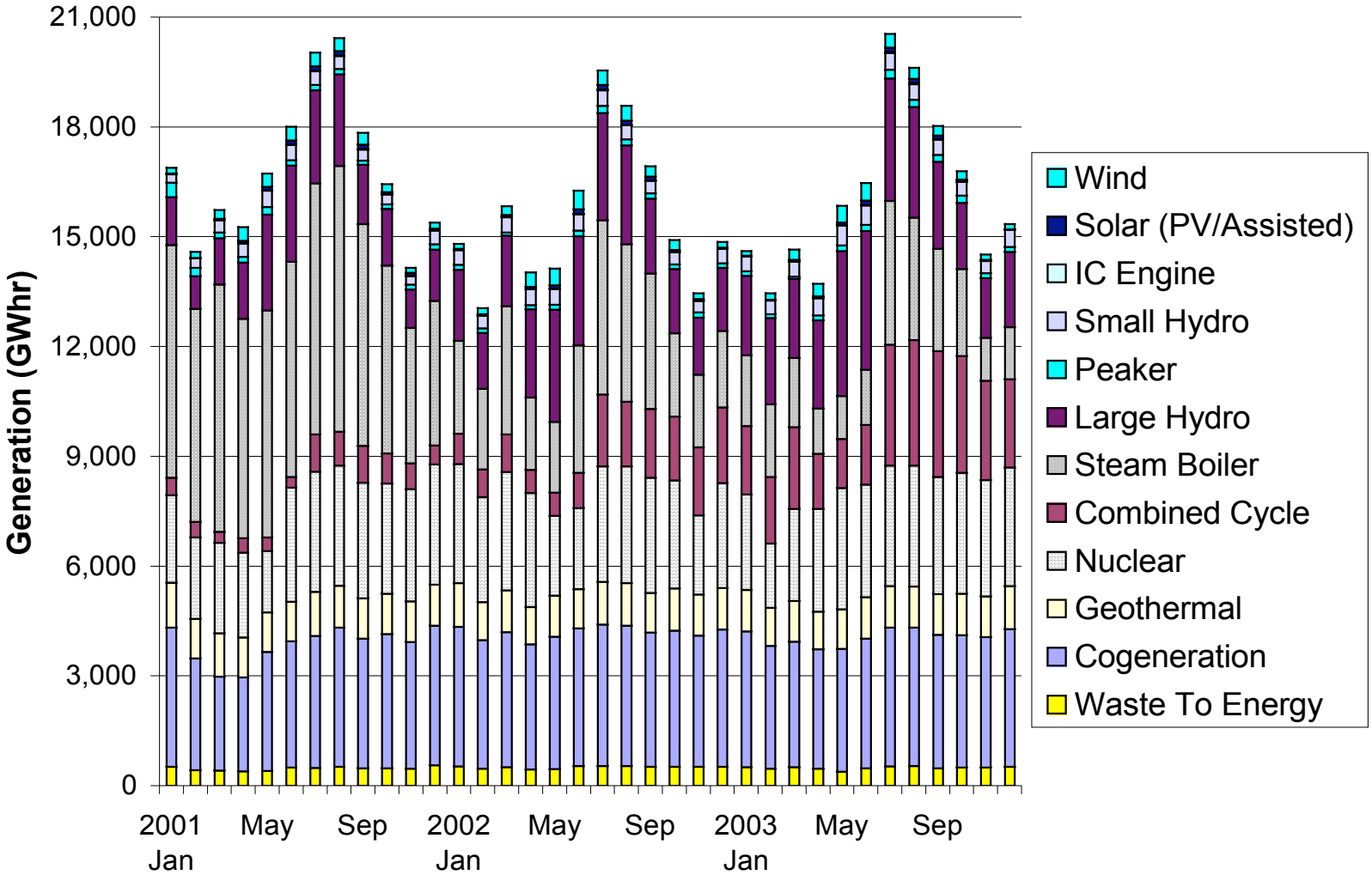


Fig. 3-2: 2001 to 2003 California Generation Category Average Capacity Factors

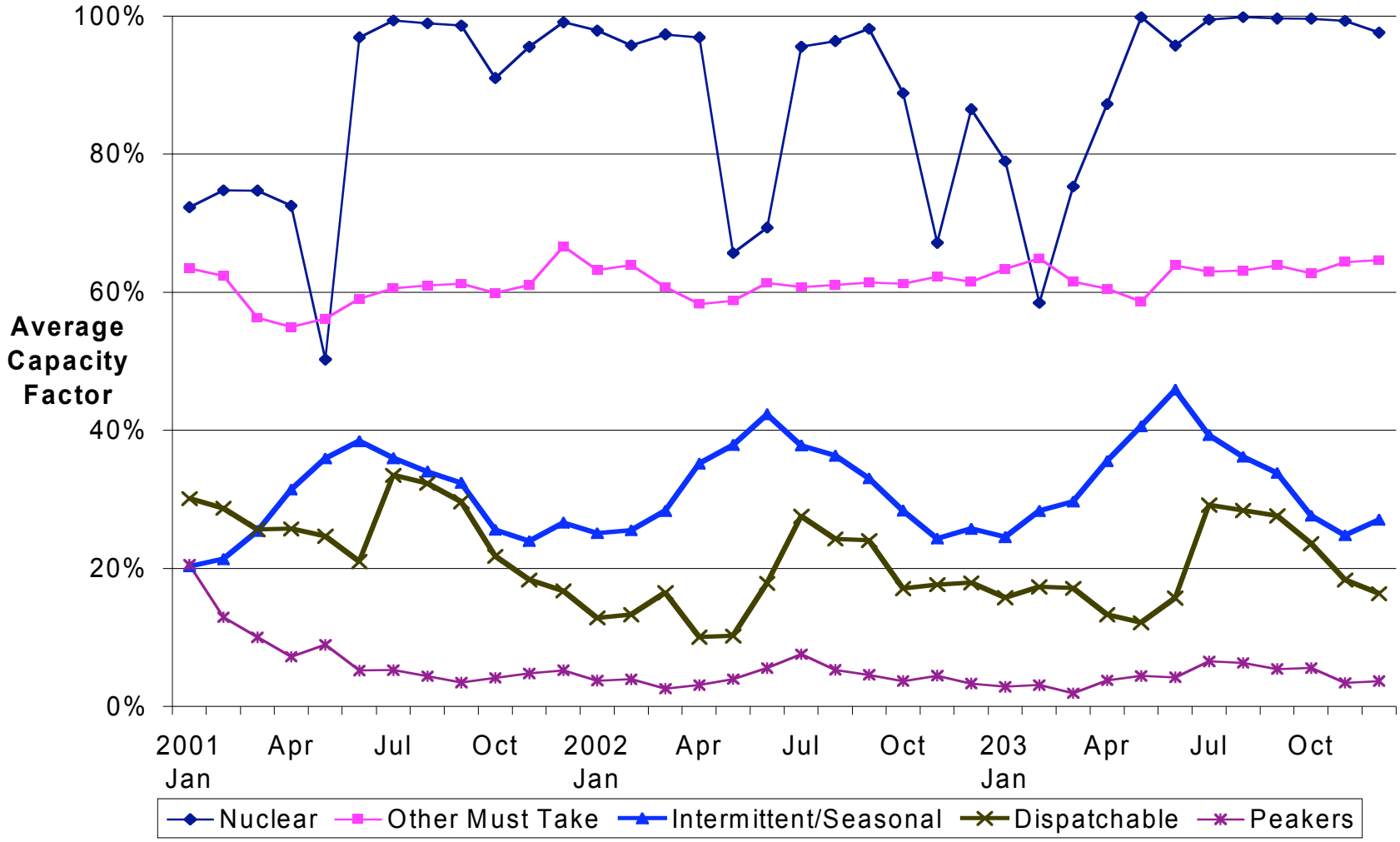


Fig. 3-5: 2001 to 2003 Statewide NOx Emissions (tons/month) and NOx Emission Factor (lbs/Wh)

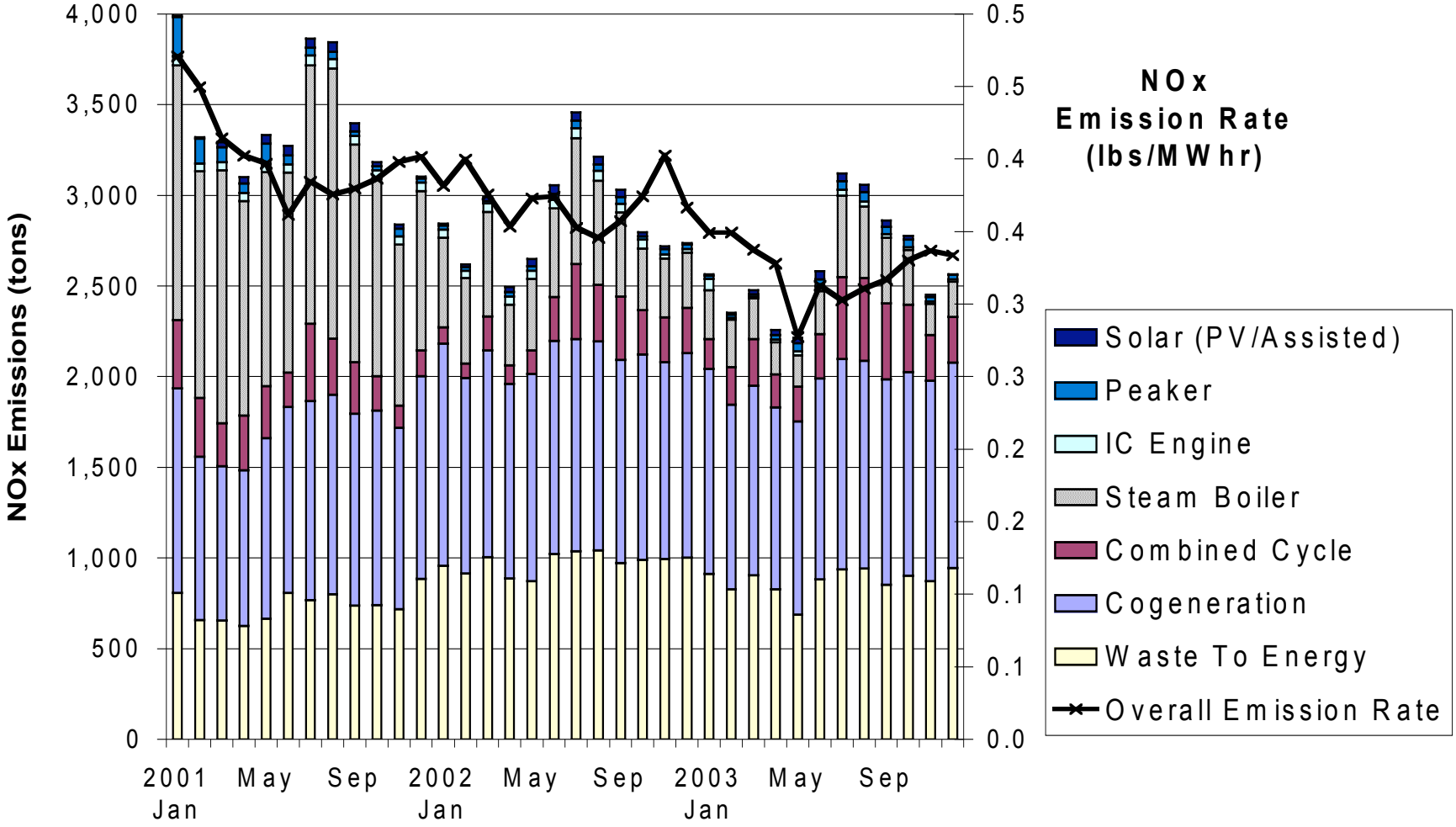


Fig. 3-6: 2001 to 2003 Statewide CO_2-eq Emissions (1000-tons/month) and CO_2-eq Emission Factor (tons/MWh)

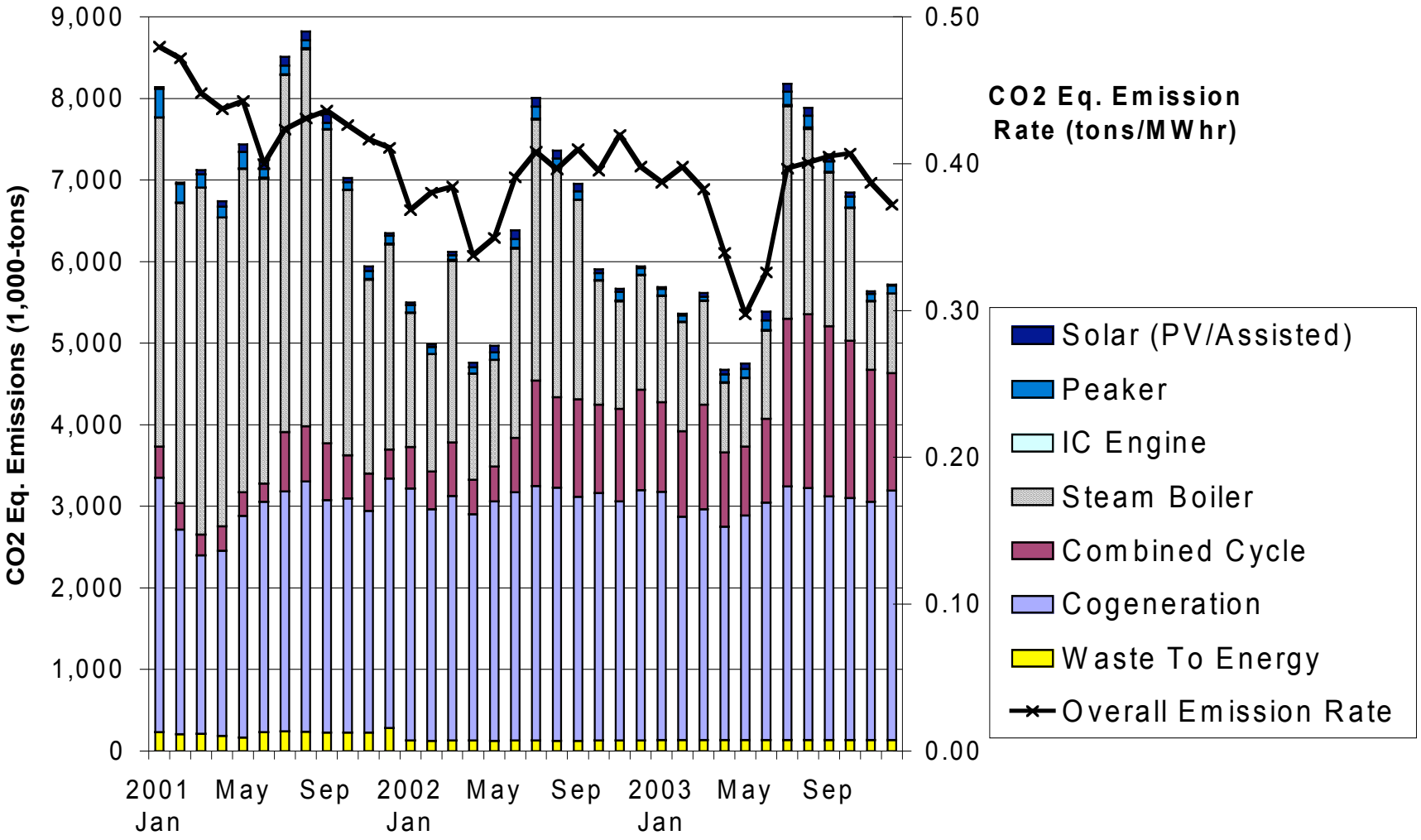
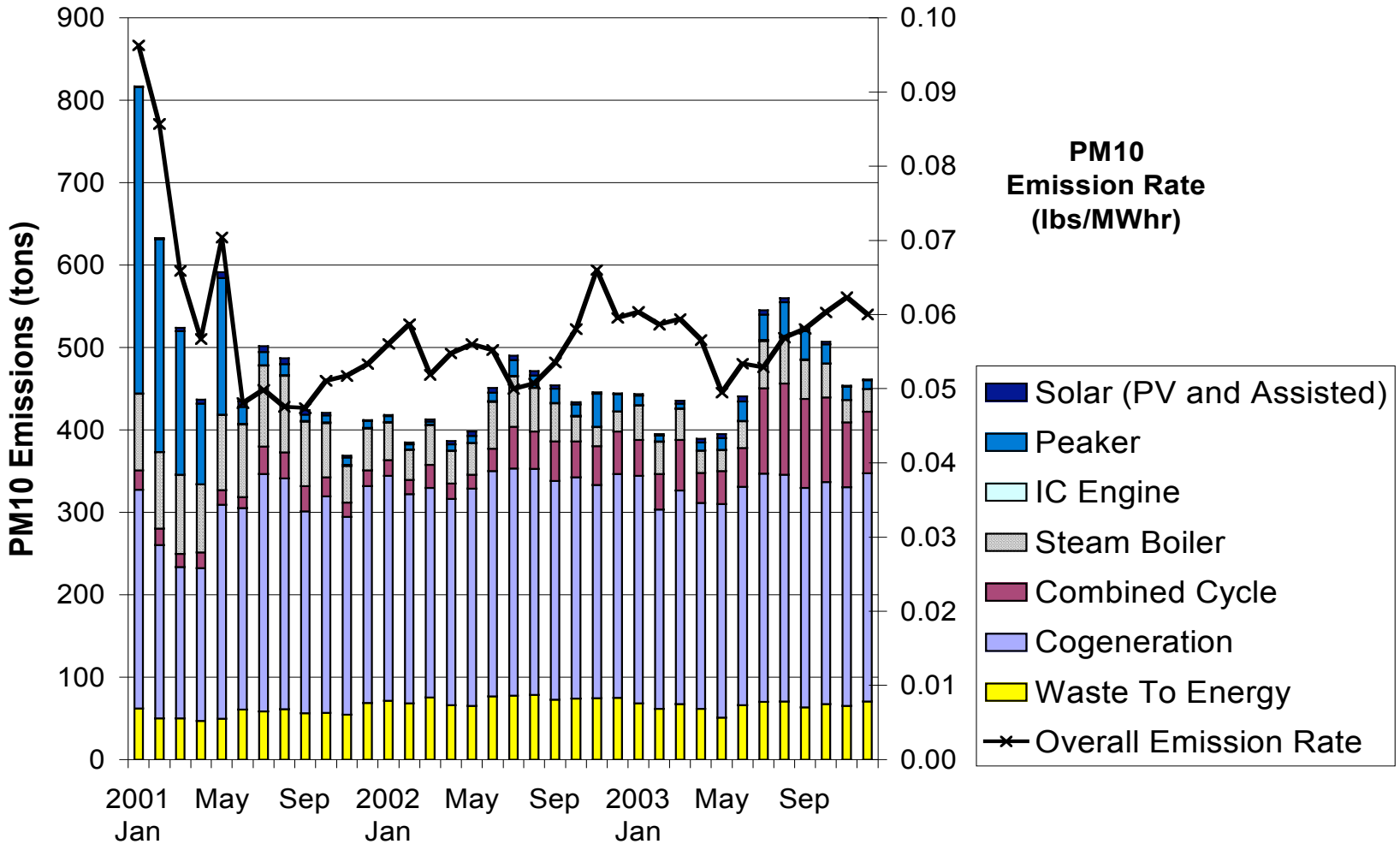


Fig. 3-8: 2001 to 2003 Statewide PM10 Emissions (tons/month) and PM10 Emission Factor (pounds/MWh)



South Coast Air Quality Management District

- Generation MWhrs dominated by steam boilers, which follow seasonal variations.
- NOx and PM10 generation emissions are dominated by in-basin cogeneration.
- NOx Emission factor improves in summer months as more generation comes online, suggesting that the steam boilers and combined cycles are cleaner than emissions averages and reduce the emission factor.
- CO_2-equivalent emissions from generation are about split between steam boilers and cogeneration.

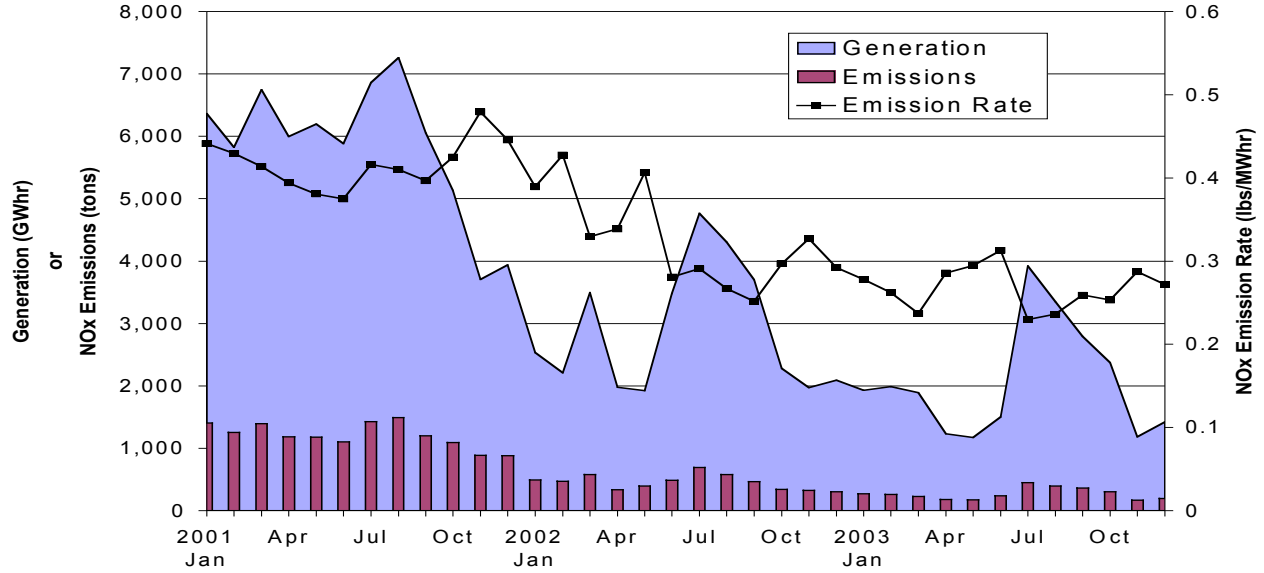
Bay Area Air Quality Management District

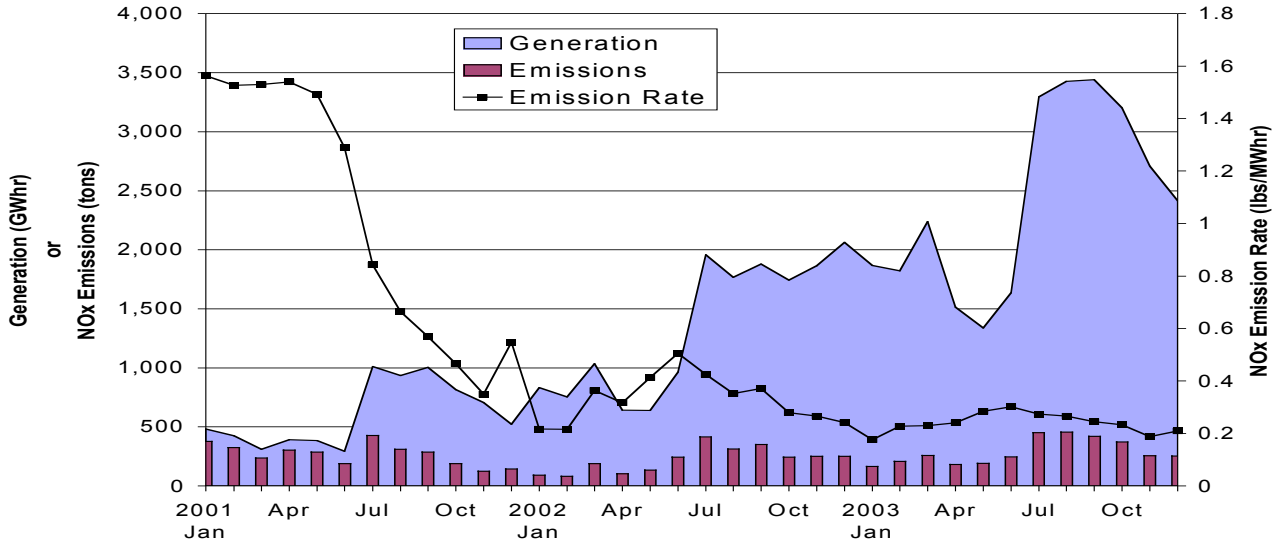
- Several modern combustion turbine combined cycles began operation during 2001 to 2003.
- The operation of peakers during early 2001 had a minor effect on total NOx emissions and the emission factor but affected PM10 emissions, which are normally dominated by cogeneration.
- NOx more closely related to the cogeneration sector and the steam boilers. As the generation from the steam boilers declined, emissions and the emission factor for the oxides of nitrogen have declined.
- CO_2-eq emissions appear to be indifferent to whether steam boiler or combined cycles are operating.

San Joaquin Valley Air Pollution Control District

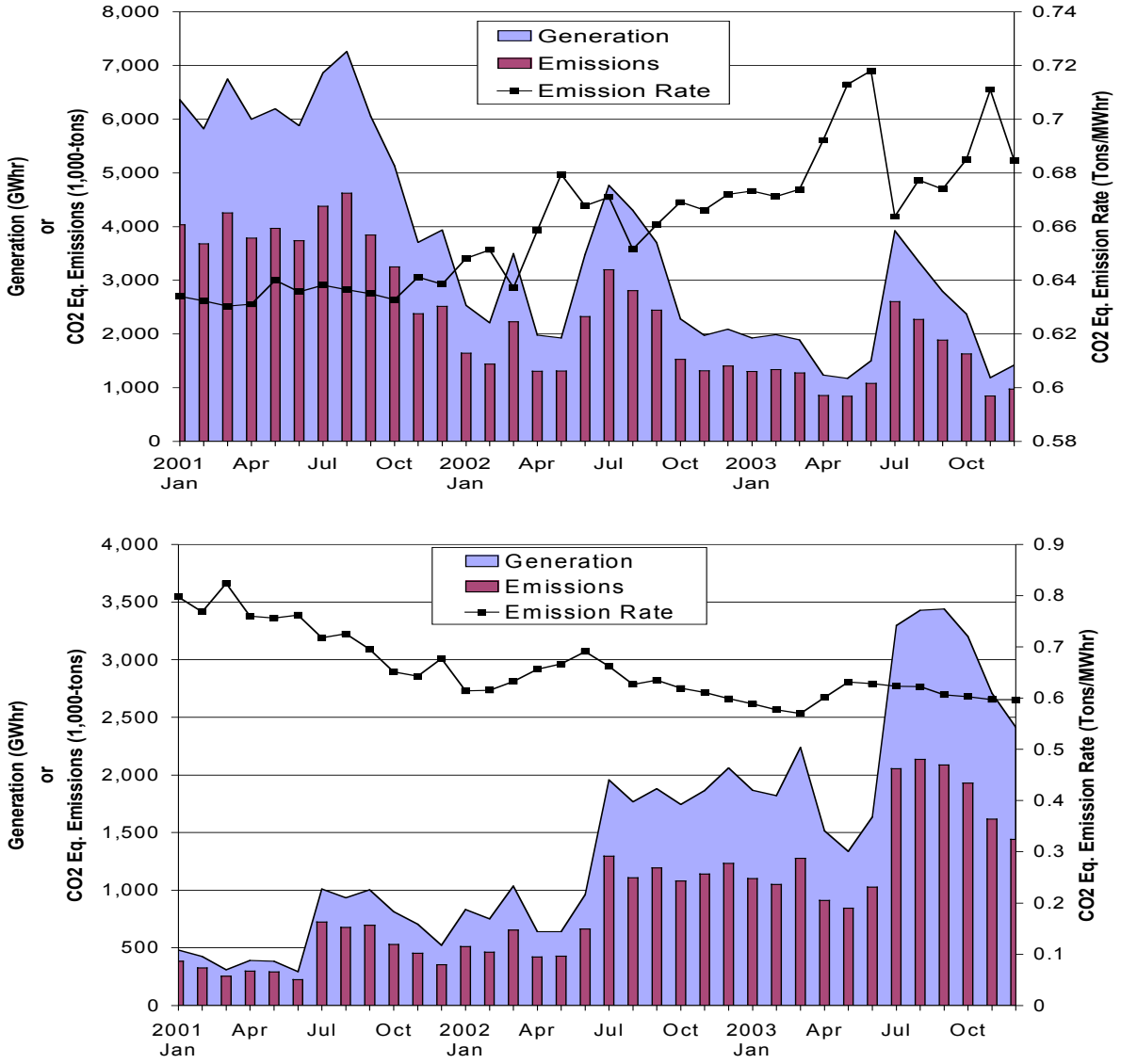
- Generation emissions dominated by cogenerators.
- Several modern combustion turbine combined cycle units came online in 2003.
- “Emissionless” generation, such as wind and hydro, cause a seasonal variation in emission factors and result in lower emission factors than Bay Area or South Coast.
- No steam boilers currently operating in the district.

Steam Boiler (Top) and Combined Cycle (Bottom) NOx Emission Factor Comparison





Steam Boiler (Top) and Combined Cycle (Bottom) CO_2 Emission Factor Comparison



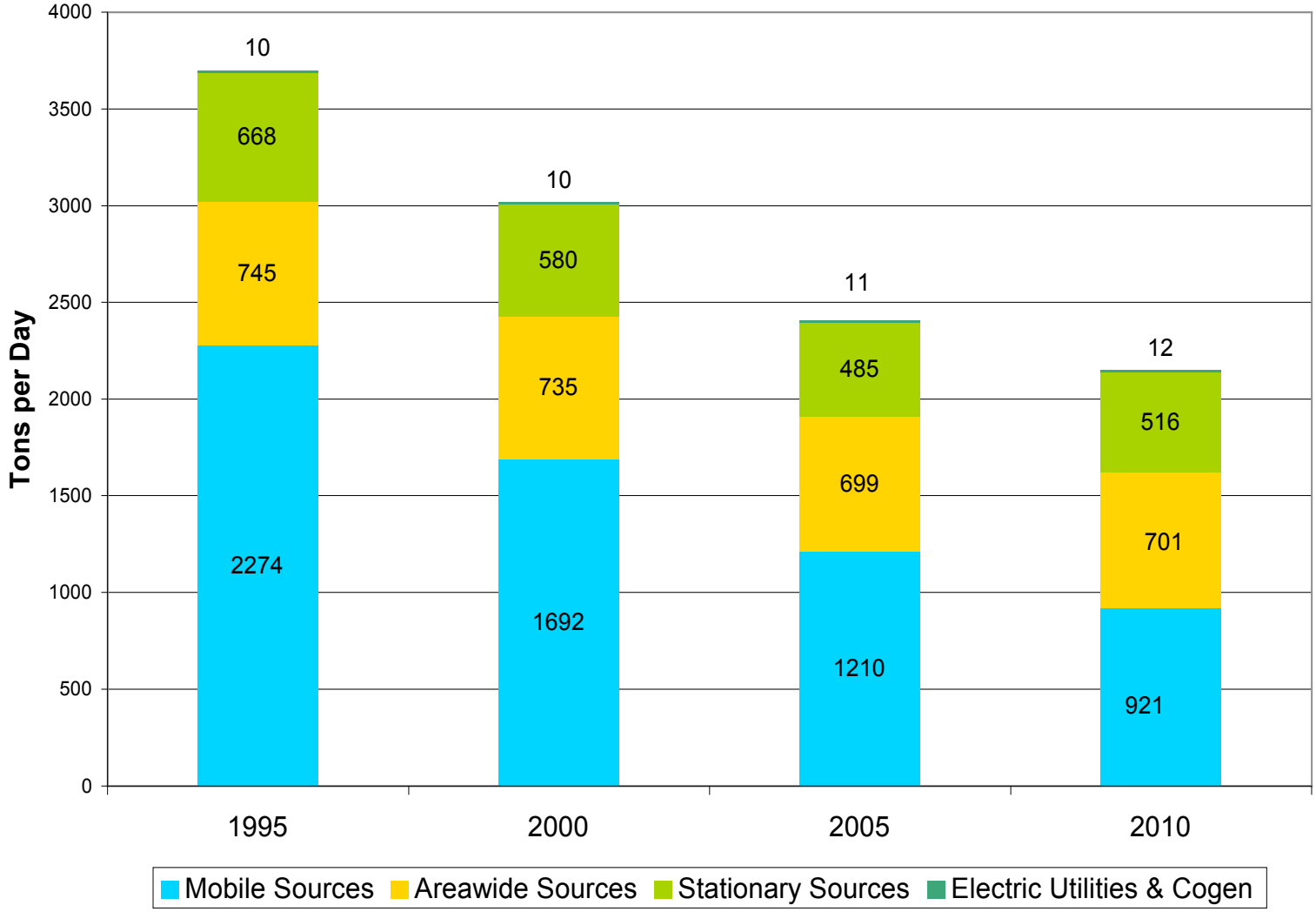
Public Health Summary of Findings

- Air toxics from the normal operation of electric generation facilities are not major contributors to regional public health risk.
- Risk assessments show no significant localized cancer or noncancer risks associated with the normal operation of any individual electric generation facility.
- Mobile source emissions, especially diesel particulate matter, dominate regional air quality and public health risks in most areas of the state.

Highest Risk Toxic Air Contaminants and Their Sources (Statewide by Sector)

Toxic Air Contaminant	Cancer Risk (chances per million)	Contribution to Total Cancer Risk[1] (percent)	Percent of Toxic from Stationary Sources[2,3]	Percent of Toxic from Areawide Sources[2,4]	Percent of Toxic from Mobile Sources[2]
Diesel particulate matter	540	71.2	5	0	95
1,3-Butadiene[5]	74	9.8	1	13	83
Benzene	57	7.5	15	1	84
Carbon Tetrachloride	30	4.0	100	0	0
Formaldehyde	19	2.5	14	1	76
Chromium (hexavalent)	17	2.2	48	52	0
para-Dichlorobenzene	9	1.2	1	99	0
Acetaldehyde	5	0.7	3	23	74
Perchloroethylene	5	0.7	68	32	0
Methylene Chloride	2	0.3	52	48	0
TOTAL RISK	758	100	n/a	n/a	n/a

Reactive Organic Gases Emissions by Sector (Statewide)



AB2588 Health Risk Assessment
Results for Electric Generation Facilities

Air District	Number of Facilities Required to Report	Cancer Risk	Number of Significant Risk[2] Facilities
Bay Area	25	<10	0
Sacramento	4	<1	0
San Diego	10	<1 - 2	0
San Joaquin	36	<1 - 5	0
South Coast	32	0.02 - 4.98	0

Environmental Performance
Water-Related Issues and Findings

Natasha Nelson & John Kessler
Environmental Office
California Energy Commission
June 27, 2005

Water is Valuable in California

- Population is projected to increase to 47.5 million people by 2020 (was 34 million in 2000).
- Groundwater supplies are a limited and over-drafted resource in many parts of California.
- Surface water supplies are essentially fully appropriated.
- After 50 years of reliance, CA's loss of 1 million AFY from the Colorado River reduces existing supplies.

Water is Scarce in California

- Future "average year" fresh water shortages are expected in all but a few regions.
- SWP deliveries could be cut to 20% of primary contractual supplies during a drought like 1977.
- Competition for fresh water is leading to reliance on sources of lesser quality such as desalinized seawater and displacing agricultural use.
- The availability of water can be a major constraint for new power plant projects.
- Fresh water conservation is an Energy Commission and statewide goal.

Comparison of Typical Water Use Levels for Cooling Technologies for a 500 MW Combined Cycle Combustion Turbine Power Plant

Cooling Process	Consumptive or Non-Consumptive	Gallons per MWh	Acre-feet per year
Once-through	Non-consumptive	40,000	250,000
Wet Cooling Towers	Consumptive	250	4,000
Dry Cooling	Consumptive	30	230

- There is a potential for energy facilities to affect:
  - Fresh water supply and quality of surface and groundwater.
  - Marine, bay and estuarine ecosystems.

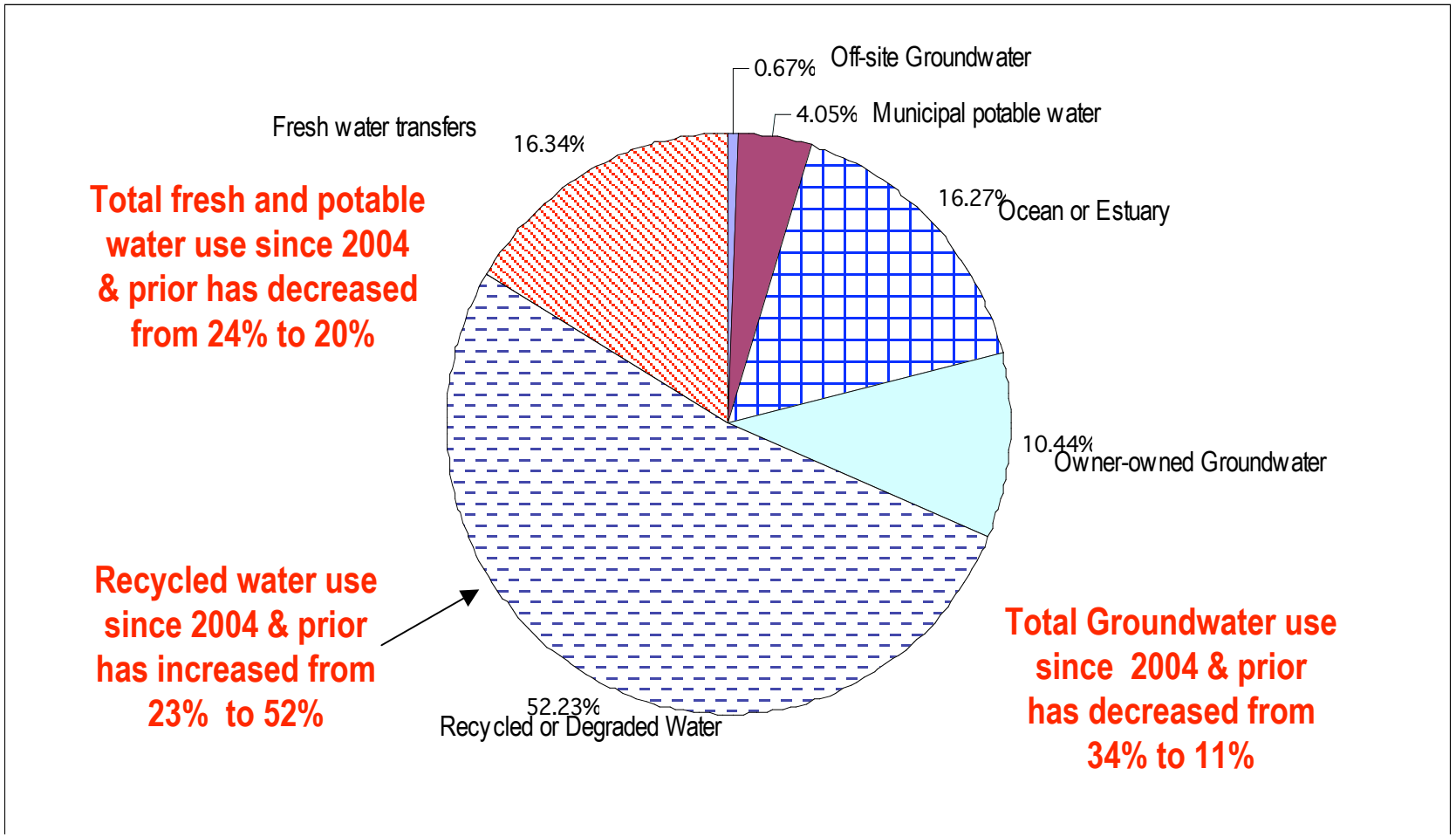
IEPR 2003 – Water Conservation

- **The Energy Commission adopted a water conservation policy:**

  "the Energy Commission will approve the use of freshwater for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound"

- **Result:**
  - Reduction in fresh surface water and groundwater use proposed for power plant cooling.
  - Increase in cooling with degraded and recycled water, and
  - Applicant's considering alternative cooling.

Proposed Cooling Medium for the 14,563 Megawatts Currently Under Construction, Permitted but Delayed, or In Review as a Percent of Installed Capacity



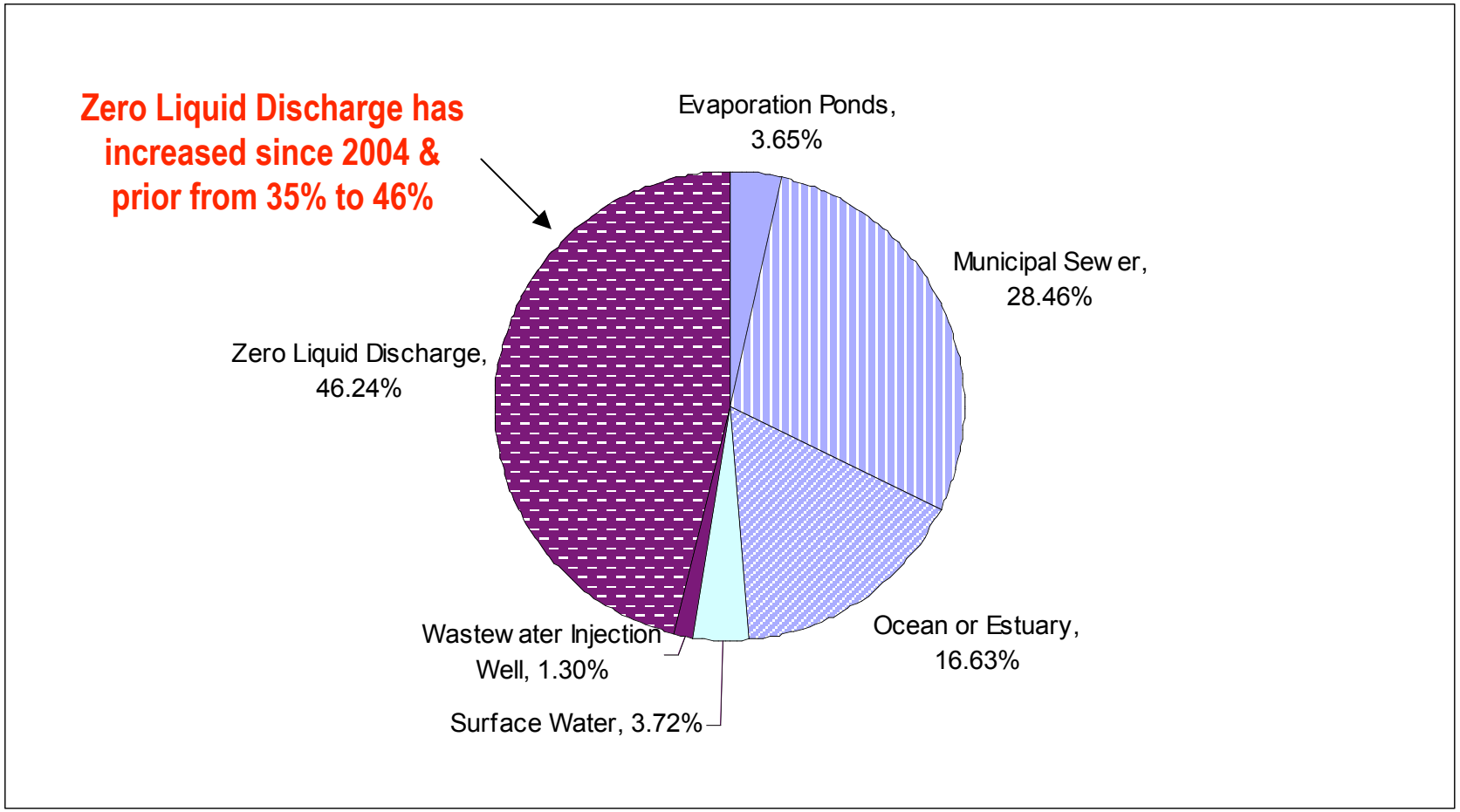
IEPR 2003 – Wastewater Reuse

- In order to reduce the use of freshwater and to avoid wastewater discharges the Energy Commission adopted in the IEPR 2003:

  " the Energy Commission will require zero-liquid discharge technologies unless such technologies are shown to be environmentally undesirable or economically unsound."

- Result:
  - Wastewater discharge is being reduced
  - Water is being conserved

Disposal Method for the 14,248 Megawatts Currently Under Construction, Permitted but Delayed, or in Review as a Percent of Installed Capacity



Continuing Concerns

- Once-through cooling at existing and repowered plants perpetuates water quality impacts to coastal and bay aquatic resources.
- Where hydroelectric facilities operate, they can cause significant habitat and water quality effects.
- Water use by power plants can be reduced significantly compared to traditional uses, and can be conserved for higher beneficial purposes.

Trends and Findings

- Competition for fresh water is increasing as a result of rapid population growth and economic development.
- Power plant water use can cause significant local impacts.
- Since 1996, new power plants are using less fresh water per megawatt by increasing use of recycled water and more efficient cooling technologies.

Trends and Findings (continued)

- Use of zero-liquid discharge systems is reducing water quality effects to surface and groundwater and is contributing to water conservation.
- As of 2005, only ~25% of FERC-regulated hydropower projects meet, or will soon meet current water quality standards to avoid ongoing and under-mitigated impacts to rivers and streams.

Policy Issues for Consideration

- Update siting review guidelines for local agencies permitting power plants less than 50 MW to establish a more consistent practice for conserving local water supplies and promote understanding of power plant water conservation technologies;
- Establish a program to evaluate alternative water sources and water conservation opportunities at existing power plants relying on fresh water; and
- Continue research and development of water spray enhancement of air-cooled condensers (dry cooling) to improve power plant efficiency while reducing water use

Electricity
Environmental Performance Report

- BIOLOGICAL RESOURCES -

Rick York
Environmental Protection Office
California Energy Commission

Biological Resources Topics in 2005 Environmental Performance Report

- ***Terrestrial Habitat Impacts***
  - Habitat loss
  - Nitrogen deposition
  - Linear facilities – new transmission lines, gas pipelines
  - Avian collisions with wind turbines
  - Avian collisions and electrocution – transmission and distribution lines
- ***Aquatic Habitat Impacts***
  - Once-through cooling
  - Hydroelectric facilities

TERRESTRIAL HABITAT IMPACTS

- *Habitat Loss* -

- Since 1996, 23 operation natural gas-fired power plants (~8,150 MW) licensed by Energy Commission caused permanent loss of 1,039 acres – 895 acres were natural lands, while 144 acres were primarily developed lands
- Majority of these projects were constructed on agricultural or industrial sites, however new transmission and natural gas pipelines were constructed on undisturbed lands in arid lands (Mojave Desert, western Kern County) which accounts for the majority of undisturbed habitat acreage impacts

- Habitat Compensation -
The Good News

- Habitat impacts were compensated for by the purchase of 2,229 acres of compensation habitat
- 14 of the 23 projects were required to provide habitat compensation

TERRESTRIAL HABITAT IMPACTS
- *Nitrogen Deposition* -

- Nitrogen deposition on nitrogen-poor soils fertilizes the habitat and promotes the growth of nitrogen-loving plants (weedy species) which out-compete native plants and the sensitive species (federally protected butterfly species) that depend upon them for food
- Vehicles are major contributor, however power plant contribute to the cumulative concern
- Since 1999 (Metcalf Energy Center Project/Santa Clara County), nitrogen emission impacts to sensitive species and their nitrogen-poor habitat has been a new issue for Bay Area projects
- Also an issue for Otay Mesa (San Diego County), Los Esteros 1 & 2, Pico and San Francisco Energy Reliability Project (2005)

Bay checkerspot butterfly

- Thousands of dollars of additional habitat compensation funds have been required/provided to manage protected areas
- Energy Commission's Public Interest Energy Research (PIER) Program has begun to inventory potentially nitrogen-saturated habitats in California to help determine where nitrogen emissions are likely to be a significant issue for power plant siting cases

TERRESTRIAL HABITAT IMPACTS
- *New Linear Facilities* -

- Since 1996, several new natural gas pipelines and transmission lines have been constructed
- More than 300 miles located in the California desert and other arid environments
- 'Temporary' disturbance in arid environments often take many decades for vegetation to recover (even with restoration) and impacts are often permanent
- Future linear facilities need to use existing corridors, not create new ones, especially when located in natural habitat

TERRESTRIAL HABITAT IMPACTS

- *Avian Collisions and Electrocutions* -

- Since 1996, California focus has been research to help understand the avian collision and electrocution issue and to develop ways to reduce avian impacts
- Problem areas have been identified and retrofits have been made to some to help make power outages/avian impacts less frequent
- Guidelines developed, but standards have not been adopted
- Line placement and configuration and the use of “bird flight diverters” can lower collisions
- PIER research continues – new mitigation measures to be implemented and monitored

TERRESTRIAL HABITAT IMPACTS

- *Avian Collisions with Wind Turbines* -

- Estimates of 1700 – 4700 birds, including many hawks and eagles, killed annually in Altamont Pass Wind Resource Area (Alameda County)
- Current trend may soon be to repower or replace smaller less efficient turbines with fewer, but larger and more efficient turbines
- New mitigation measures may include siting the new, larger turbines where they pose less of a threat
- PIER research focusing on understanding problems, developing new mitigation measures, and implementing/monitoring their effectiveness

AQUATIC HABITAT IMPACTS

- *Once-Through Cooling & Coastal Power Plants* -

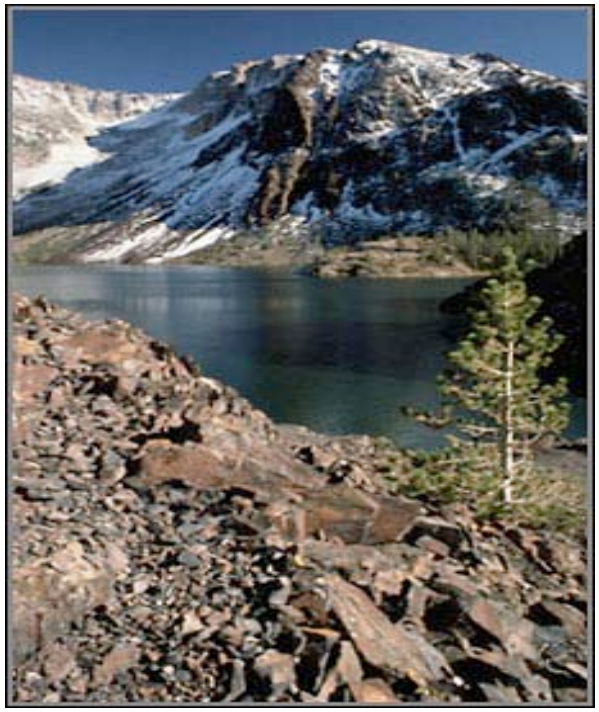
- Still have 21 facilities using once-through cooling in California, but we may have fewer in near future (Hunters Point, Long Beach, more???)
- Likely to have new desalination units co-located at several coastal power plants which will extend the life of these power plants and continue coastal ecosystem impacts
- Early stages of NPDES permit renewals under new 316(b) regulations, so no operational or technology changes required yet – more information in 2007 EPR
- Since 2000, Energy Commission has licensed four repower projects and allowed for the continued use of once-through cooling

AQUATIC HABITAT IMPACTS
- *Hydroelectric Development* -

- FERC relicensing – 44 projects totaling about 5,000 MW (37% of state system) scheduled for relicensing by 2015
- Most do not meet current environmental standards
- Once-in-a-lifetime opportunity to bring old facilities & licenses into conformance with modern scientific and regulatory standards

Hydroelectric Development
- *Selective Decommissioning* -

- Selective decommissioning of low power/high impact projects underway
- Energy Commission continues to work with CDFG and State Water Board to help assess energy and environment issues
- *Klamath Relicensing* - Agencies determined that decommissioning is a viable project option and have asked FERC to evaluate this option during relicensing process
- *Kilarc-Cow Creek Project* – "the environmental benefits of removing this small facility outweigh its electricity generation benefits"



Policy Issues For Consideration

- **Once-Through Cooling & Avian Collisions and Electrocutions** – included in white papers and will be discussed during June 28th (Tuesday) workshops
- **Habitat Losses -**
  - Continue to urge the use of brown field (industrial) sites for power plant development and the use of existing linear corridors, instead of establishing new corridors in arid environments
- **Hydropower -**
  - Expand our understanding of environmental damage to levels commensurate with air emissions or water use
  - Continue to provide technical support on energy and energy cost issues in FERC relicensing and to state agencies as they evaluate selective decommissioning of low power, high impact projects
  - Encourage state to provide sufficient staff and funding for resource agencies to participate in relicensing proceedings

Social and Community Issues

Cultural Resources

- Native Americans are becoming more involved in project planning and cultural resources management
  - SB 18 requires local governments to consult with Native Americans on General and Specific plan changes, and allows for conservation easements
  - FERC established a tribal liaison and consultation policy for hydroelectric re-licensing
- Some California tribes are exploring environmental justice as another pathway to protect cultural resources and traditional lifeways

Land Use

- Local agencies sometimes overlook the need for new energy facilities in their general plans
- Brownfield sites often have available infrastructure and may be ideal locations for new power plants if they are within existing heavy industrial areas
- Development of new energy infrastructure in urban areas often occurs close to residential areas, schools, and recreation areas
- The IEPR Committee should consider proposing a new Energy Commission program to provide assistance to local government in preparing energy elements that reserve land for new energy facilities

Land Use Continued

- Modernization and expansion of existing coastal power plants are controversial because the coast is viewed as a visual, recreational, and ecological resource
- Recently approved modernizations of two coastal plants include measures to enhance degraded visual quality and improve public access to coastal recreation areas
- Seven recently approved projects will permanently convert 261 acres of farmland, including 60 acres under Williamson Act contract. The Energy Commission found the impacts on agriculture to be significant in four of these cases, and required mitigation for the loss of 186 acres

Environmental Justice

- As of Census 2000, minorities comprise the majority of California's population
- Environmental justice will likely be a consideration in siting most future power plants
- The Energy Commission and electric generation industry should work together to develop site selection criteria to avoid adding impacts to disproportionately impacted low-income and minority communities

Socioeconomics

- The Renewable Portfolio Standard will stimulate economic growth and increase renewable sector employment
- Modern gas-fired power plants require substantially fewer operating personnel than older steam plants
- Employment for electric generation, transmission and distribution will increase approximately 12 percent between 2002 and 2012